STATE OF MONTANA
MONTANA DEPARTMENT OF TRANSPORTATION
JOB PROFILE

☐ Update

☑ Formal Review

Date Submitted _____

SECTION I - Identification

Working Title:
Materials Manual and Implementation Specialist

Department:
Transportation

Job Code Number:
172516

Division & Bureau:
Engineering/Materials

Job Code Title:
Civil Engineering Specialist

Section & Unit:
Physical Test Section

Pay Band:
6

Work Address:
2701 Prospect Ave
Helena, MT 59620

Position Number:
40009

Phone:
406-444-6200

☐ FLSA Exempt ☑ FLSA Non-Exempt ☐ Non-Union ☑ MPEA ☐ Blue Collar

Profile Completed By: Ross “Oak” Metcalfe

Work Phone: 406-444-9201

Work Unit Mission Statement or Functional Description:
The MDT's mission is to serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and sensitivity to the environment.

The Highways and Engineering Division prepares projects for bidding and coordinates highway construction. The Division is made up of the Materials, Construction, Right-of-Way, Bridge, Traffic and Safety, Environmental Services, Engineering Oversight, and Preconstruction bureaus; the CADD Systems and Engineering Management Support sections; and five District Construction Offices in Missoula, Butte, Great Falls, Glendive, and Billings for budget and workforce purposes.

The principal goals of the Materials Bureau of the Department of Transportation are to develop and implement comprehensive data collection, testing, and analysis programs that facilitate pavement project selection and pavement surface and subsurface design that addresses Montana's most important statewide transportation needs and to support the quality of materials incorporated into Montana's highway system. These activities help officials select projects and provide information for short and long-range engineering and construction programs. These goals are addressed through the

complex interaction and interrelationship of the Bureau's three Sections. The Bureau consists of the Geotechnical Section, Physical Testing Section, and Pavement Analysis Section.

The Geotechnical section is responsible for foundation investigation and design, slope stability analysis, soil and rock testing, groundwater and subsurface drainage, and subgrade recommendations. The Physical Testing Section is responsible for bituminous mix design, cement-treated base mix design, asphalt properties, chemistry, concrete and aggregate testing, quality control, and special projects. The Pavement Analysis section is responsible for surfacing design, non-destructive testing, pavement management, information services and research.

Describe the Job's Overall Purpose:

This position is the Materials Implementation and Test Method Specialist in the Materials Bureau of the Montana Department of Transportation. In order to ensure the development and construction of high quality, cost-effective transportation projects for the traveling public; this position maintains the Montana Materials Manual by researching, developing, and updating effective standard materials testing methods and sampling procedures; and implementing work plans and objectives for new and innovative material testing processes and equipment. This is achieved by performing in-depth analyses of national and international standard test methods and equipment; material properties; materials engineering design concepts and practices; departmental, local, and federal contract administration laws, regulations and policies; and specific MDT concerns and considerations. This position also researches, procures, and implements any new equipment and/or apparatuses required to perform said test methods and processes precisely, accurately, and efficiently.

The Materials Manual is a contractually binding document between the Department and awarded contractors on highway and bridge construction projects. Standard test methods provide the basis for material acceptance and incorporation into road and bridge projects. They also provide the basis for pay incentives and deductions to contractors performing work on the behalf of the Department. Uniform test methods are required to ensure a clear understanding of the contract intent; to reduce the potential for disputes, claims, or litigation; and to prevent the non-participation of funding by the Federal Highway Administration (FHWA).

The position reports to the Testing Engineer (#40030).

SECTION II - Major Duties or Responsibilities

This section should be a clear concise statement of the position's major duties *and the approximate percent of work time for each duty.* ***% of Time***

A. <u>DEVELOP, MAINTAIN, AND UPDATE THE MONTANA MATERIALS MANUAL</u> 60%

Helps accomplish the Department's goals to build a cost effective, safe, environmentally sensitive transportation system through the development of new and innovative test procedures that promote contractor ingenuity and reduce contract costs while ensuring quality construction materials and practices are incorporated in MDT construction projects. Perform advanced research and evaluation on new and proposed test methods, construction practices, and construction materials from various standardization organizations (AASHTO, ASTM, WAQTC, etc.), construction industry, and MDT staff to determine if the Department needs to update its' current method(s) of sampling, testing, and acceptance of a particular material. Researches and monitors changing methods, technologies, and professional standards in materials engineering and testing in order to: stay up to date with the standard of practice in the industry; assess the applicability of any new or proposed methods to supplement or replace current practices; and investigate and develop solutions to complex construction administration problems and deficiencies.

1. Responsible for the overall development, integration and management of all standard test methods and processes to establish the contractual requirements for each aspect of highway and bridge construction. Test method and procedure language is technical in nature but must be written to provide clear understanding of the procedure to a person with limited knowledge of the subject. Clear, concise and uniform language is developed to ensure an understanding of the method's intent; to reduce the potential for misinterpretation by design, district lab, construction, and contractor personnel; and to assure Department and contractor compliance with all local, state, and federal policies, rules, standards, and laws. Test method development requires research and establishing and maintaining contacts in various areas of expertise, and the balancing of often conflicting and/or contentious needs of other Department bureaus, material suppliers, and the contracting community. Each test method and process goes through multiple drafts and is continually evaluated to verify the language is uniform, accurately describes the work and responsibilities of all involved parties, and to ensure the method or process does not conflict with requirements of other methods or processes or other areas of the contract.

2. Reviews, analyzes, researches, and accepts or rejects all requests for new or revised test methods or procedures. Requests are received from FHWA, Legal, other Department bureaus and sections, contractors, equipment manufactures, and materials suppliers. An in-depth and thorough evaluation of the proposed revision or new method is performed to ensure that language is consistent with current specifications; identify any conflicts with existing specifications, standard special provisions, and state and federal laws and regulations; detect language that may create an undue advantage to a specific or select group of material suppliers, equipment manufactures or contractors and verify that proposed changes are complimentary to the department mission and goals. This position must fully understand the concepts, theories, and practices related to all highway construction materials, construction practices, and contract administration to perform an accurate analysis of the method according to specifications and the related construction processes and equipment to verify compliance and consistency with existing contract administration policies and procedures and State and federal regulations; and identify if revisions warrant modifications to specifications or design standards and practices. Annually reviews existing test methods and procedures to identify, revise, or eliminate antiquated language and processes and submits and justifies any and all changes to the existing Materials Manual to FHWA for approval. FHWA's acceptance of the Materials Manual serves as their acceptance of the Materials program in general which in turn allows MDT to continue to receive Federal Aid. Continual communication and coordination with the respective Department bureaus, field staff, inspectors, legal counsel, contractors, material suppliers, and other state, federal, and local agencies are required and maintained year-round in order to make these determinations.

3. Conducts in-depth research and analysis of engineering design and construction standards, industry developments, and construction equipment, materials and methods to identify potential applications of emerging technology and techniques and identify test methods and procedures needed for new equipment, materials, and construction methods. This involves contacting experts at research and testing centers; reviewing technical reports and studies; evaluating historical data; reviewing active construction projects; consulting department staff, FHWA, contractors, equipment and material vendors, and others as necessary to verify anticipated highway construction needs and requirements. The position looks for trends in the information to provide the basis for developing test methods and procedures that positions the department proactively rather than reactively.

4. Researches and analyzes national and other state test methods and procedures to improve contractor efficiency and reduce contract costs. By providing uniformity in contract language between Montana and the surrounding states, out-of state contractors that bid on projects in

this area, as well as Montana based contracting firms trying to expand their business base can attain contract cost savings from the reduced need for specialized equipment, and a familiarity in testing requirements, procedures, etc. found in these uniform standards. This research is accomplished through individual state contacts, out-of-state travel to regional meetings to discuss state practices and testing protocols, and literature reviews to identify areas where consistency can be introduced and maintained.

5. Implements new test procedures through extensive coordination internally and externally so that undue hardship is not imposed upon the Department, the consulting and contracting communities, material suppliers, etc., letting schedules are maintained, and State and federal requirements, as well as MDT goals and objectives are met. This position must communicate and coordinate effectively with all construction entities (consultants, contractors, district and headquarters) and design units, so that projects at various stages of development are able to consider new procedures or testing protocol during the design phase, field personnel are aware of the new test or procedure, and district lab personnel can become familiar with changes in order to uniformly execute and apply test methods based on effective dates relative to letting dates .

   Develops and publishes the Montana Materials Manual of Test Procedures. Identifies and implements state of the art electronic media formats for publication and distribution of the Manual, which allows for ready access and electronic querying by all parties (contractors, Department personnel, suppliers, regulatory agencies and general public) that have need for the Manual. Develops and implements electronic management tools that allow for more frequent and timely upgrading of the Manual and linkage of elements within the Manual and to other applicable documents such as the Standard Specifications for Road and Bridge Construction.

B. MATERIALS RESEARCH AND DEVELOPMENT 20%

This position is responsible for developing, implementing, and refining quality testing, and field control testing materials design parameters. This includes developing and establishing work plans and procedures; directing and coordinating implementation projects, original materials research strategies, and testing parameters; developing and recommending new materials engineering standards and specifications; developing and implementing experimental test projects; and designing and conducting special materials-related research projects. This requires extensive knowledge of the theories, concepts, and principles of civil engineering, mathematics and physical sciences, and materials engineering and design principles; knowledge of the methods and practices of highway construction engineering and related policies, methods, procedures, specifications, and standards and regulations; contract administration and claims management; advanced research methods and techniques; and applicable state, federal, AASHTO, and FHWA requirements and standards. These duties also require skill in project management; analyzing and evaluating test results; developing solutions for complex materials engineering problems; and the use and application of specialized laboratory testing and analysis methods and equipment as well as the ability to conceptualize innovative solutions according to sound engineering theories; investigate, analyze, and form professional objective solutions to complex construction engineering problems; plan, organize, direct engineering activities; present and defend new or unprecedented ideas, procedures, and equipment; establish and maintain effective working relationships with others.

1. Develop and establish short and long range work plans, procedures, and objectives for the Implementation Unit to provide quality and cost effective research, testing, and implementation of new materials standards, specifications, and technologies. This involves assessing the effectiveness of existing operations, research and testing strategies, new methods and technologies, and available program resources (e.g., human, material, and financial); establishing plans and objectives that promote innovation and consistency with

broader Bureau goals; and adjusting work plans and procedures as necessary to ensure quality and cost effective program operations.

2. Direct and coordinate major implementation projects with subordinate staff, department designers and engineers, and consultants to ensure that research and development projects utilize the most current methods and technologies available while ensuring compliance with State and Federal materials specifications and requirements. This involves developing and establishing project parameters (e.g., information sources, scope, sequences, model outcomes, time and cost restrictions, etc.); directing the research and testing activities of other staff; resolving in-progress engineering problems; and interpreting results to determine the relative success or failure of new methods and technologies.

3. Develop original materials research strategies and testing parameters to evaluate theoretical engineering models. The incumbent applies advanced materials engineering theories to new and existing specifications, varying construction needs, equipment and application techniques, and cost parameters to propose new technologies and applications that meet a variety of Department needs, construction processes, and site conditions.

4. Develop and recommend new materials engineering standards and specifications based upon evaluation of test results and application of sound engineering principles. Ensure that recommended standards and specifications comply with State and federal requirements and complement existing material designs, processes, and equipment.

5. Develop and implement experimental test projects to evaluate the performance of new or improved laboratory or construction acceptance equipment. This involves developing test parameters and procedures to measure the calibration, operation, maintenance, and other equipment performance factors under various conditions and applications; analyzing and evaluating test results; and recommending experimental equipment that represents an improvement in testing reliability or definition.

6. Develop and establish equipment specifications and procedures for incorporating new equipment into construction processes. Requisition equipment as directed and provides guidance and direction to applicable headquarters lab, District Laboratories, and Field Testing personnel in specialized equipment operation, application, and maintenance. Continues to provide ongoing technical assistance as required.

7. Research and monitor changing methods, technologies, and professional standards in materials engineering and testing to incorporate appropriate innovations into ongoing investigations, tests, and analyses. Develop and present reports on new materials design and testing techniques at District meetings, other workshops, seminars, and professional conferences.

C. PROFESSIONAL AND TECHNICAL ASSISTANCE 15%

This position provides research and technical assistance services to Department staff, contractors, local and federal governments, and others. The incumbent provides detailed technical and professional advice and assistance to District personnel, FHWA personnel, materials suppliers, the public, and other bureaus of MDT. The position provides professional and technical assistance regarding experimental processes or materials; investigates and assesses the performance of highway construction materials; coordinates surveys of other states and organizations; and identifies new materials that may have applications for roadway construction. These duties require extensive knowledge of the theories, concepts, and principles of design, mathematics, and physical sciences; civil, materials, and construction engineering; highway construction and related policies, methods, procedures, specifications, standards, and regulations; advanced research methods and techniques; and applicable state,

federal, AASHTO, and FHWA requirements. The incumbent must apply skill in developing solutions for complex materials engineering problems and the ability to present and defend new or unprecedented ideas, procedures, and equipment and train personnel to apply new methods, standards, specifications, processes, and equipment effectively.

1. Research innovative applications for highway construction materials. Provide technical expertise and professional guidance to engineers in other Bureaus or Districts that are considering various options and alternatives. Apply professional engineering concepts to explain technical aspects of particular materials and provide advice for the utilization of new materials and construction process control methods.

2. Coordinate with District and Area materials laboratory personnel, managers, and consultants to provide instruction and guidance related to new specifications, testing and quality control standards, and application and equipment procedures associated with new materials. Monitor implementation of new standards and specifications to ensure compliance and resolve technical problems.

3. Investigate and assess the performance of construction materials. Write specifications or Materials Manual procedures that provide optimum materials utilization and construction techniques. Monitor, evaluate, and report construction problems, advantages, and field modifications made to newly developed processes or materials during their application.

4. Develop solutions to complex materials related construction problems and deficiencies referred by other Bureau and District personnel. Investigate and analyze engineering aspects of construction and perform detailed research and development of policies and procedures to mitigate future problems to provide more effective contract administration. Document causes and impacts of specific problems and determine and recommend materials choices or design processes to avoid recurrences.

5. Coordinate surveys of other states and organizations to gather information regarding new or alternative processes. Evaluate responses to identify methods and procedures that may enhance MDT's development and implementation of new processes or refinement of existing ones. Respond to technical questionnaires and inquiries regarding Materials Bureau design and testing functions when other state agencies, contractors, private laboratories, and professional organizations request information about MDT practices and specifications.

D. OTHER DUTIES AS ASSIGNED **5%**

Coordinate and conduct a variety of other research and development projects, special studies, technical assistance services, and other duties as assigned by supervisors in support of the Department mission and Division objectives. This includes exchanging information with consultants, manufacturers, agency staff, and the public; providing training, education, and professional and technical assistance; directing special projects; and attending ongoing education and training as directed.

The following duties and/or specific tasks listed under section II above are considered "essential functions" because they require specialized expertise and skill and are the primary reasons the job exists (they must be performed by this position with or without accommodations):

Duty A: Develop, Maintain, and Update the Montana Materials Manual
Duty B: Materials Research and Development

The following mental and physical demands are associated with these essential functions:

PHYSICAL

- Lifting and transporting supplies, samples and equipment in excess of 30 pounds.
- Carry light items (papers, books, small parts)
- Remaining seated for extended periods of time, with occasional walking; standing; bending
- Travel within the state to project locations, and out of state travel by airline to national conferences and meetings.
- Field work and the associated hazards and demands;
  - Asphalt fumes
  - Traffic
  - Extreme weather and driving conditions
  - Loud noises
  - Overhead construction equipment
  - Traversing rough terrain
- Operating a personal computer.
- Communicate in writing, in person and over the phone.

MENTAL

- Deal with contractors, consultants, and MDT field Construction and Maintenance staff on a regular basis
- Ability to multi-task
- Demands for accuracy in all aspect of work
- Ability to meet inflexible deadlines
- Decision making that affects public health and safety
- Computing arithmetic operations
- Comparing data
- Compiling information
- Analyzing
- Coordinating
- Synthesizing
- Negotiating
- Instructing.

Does this position supervise others? ☐ ***Yes*** ☑ ***No***

Number of directly supervised:

Position Number(s) of those supervised:

Attach an Organizational Chart.

See attached organizational chart

SECTION III - Minimum Qualifications - List minimum requirements for the first day of work.

Critical knowledge and skills required for this position:

KNOWLEDGE: This position requires extensive knowledge of materials inspection, sampling, testing, and analysis protocols and procedures; the concepts and theories of civil and materials engineering; and associated mathematical and scientific principles. This position also requires knowledge of project management; contract administration principles; Department mission and Division goals and objectives; state, federal, AASHTO, and ASTM testing standards, procedures and specifications; FHWA specifications and procedures; methods and techniques of highway

construction; and safety practices and procedures. Implementation responsibilities require knowledge of organizational theory and program requirements.

SKILLS: This position requires extensive skills in project management; applying analysis and judgment in arriving at solutions to routine, unusual, and unprecedented program management and technical engineering problems; developing and implementing innovative acceptance processes and materials standards; ensuring compliance with federal funding authorities; managing multiple projects simultaneously; providing effective education and training; and excellent written and verbal communication skills.

Behaviors required to perform these duties:

- **Analytical/Interpretive Thinking: Analyzes and** accurately applies new research and analysis findings, technical analyses, new methods and technologies, and project requirements to specific circumstances.
- **Decision Making:** Evaluates multiple and ambiguous factors in a logical, objective, systematic approach to identify and effectively resolve difficult engineering, research, contract, and construction problems. Exercises professional judgment to arrive at timely decisions in complex situations. Develops technically and legally defensible courses of action in response to complex or ambiguous issues, analytical conclusions and recommendations, and technical or procedural project problems.
- **Achievement:** Achieves goals and bring projects to completion. Persists and stays focused when faced with a series of challenging or uncertain situations. Demonstrates a concern for working well or for competing against a standard of excellence.
- **Independence of Action:** Researches and determines appropriate responses to project problems and opportunities with minimal assistance or precedent.
- **Team Work:** Able to share due credit with coworkers; display enthusiasm and promote friendly group working environment; work closely with other departments and the industry as necessary; support group decisions and solicit input from coworkers and industry resources.
- **Communication:** Communicates effectively in both verbal and oral form. Translates technical engineering concepts and information to audiences of varied technical levels.
- **Flexibility and Adaptability:** Remains open-minded and changes opinions on the basis of new information; performs a wide variety of tasks and changes focus quickly as demands change; manages transitions effectively from task to task ;adapts to varying customer needs.
- **Planning and Organization:** Independently plans, prioritizes and sets work schedules, responsibilities and resources. Identifies and assesses innovative alternatives. Understands priority setting is dynamic and recognizes at any given time what is the highest priority.

Education:

Check the one box indicating minimum education requirements for this position for a new employee the first day of work:

☐ No education required	☐ Related AAS/2-years College/vocational training
☐ High school diploma or equivalent	☑ Related Bachelor's Degree
☐ 1-year related college/voc. training	☐ Related Master's degree

Please specify the acceptable fields of study:

Acceptable: Engineering or construction technology

Other education, training, certification, or licensing required (specify):

An FE Certification is required.

Experience:

Check the one box indicating minimum work-related experience requirements for this position for a new employee the first day of work:

- ☐ No prior experience required
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☑ 5 or more years

Other specific experience (optional):

Alternative Qualifications:

This agency will accept alternative methods of obtaining necessary qualifications.

☑ Yes ☐ No

Alternative qualifications include:
A master's degree in a related engineering or physical sciences field may be considered as a partial substitute for work experience on a case-by-case basis.

SECTION IV – Other Important Job Information

- ☐ Fingerprint check
- ☐ Background checks
- ☑ valid driver's license
- ☐ other; describe

Other information including working conditions such as shifts, lifting requirements, travel or hours.

SECTION V – Signatures

Signature indicates this statement is accurate and complete.

Employee:

Name:_____ Title:_____

Signature:_____ Date: _____

Immediate Supervisor:

Name: Ross "Oak" Metcalfe, P.E. Title: Testing Engineer / Test Section Supervisor

Signature:_____ Date: _____

Bureau Chief:

Name: Matt Strizich, P.E. Title: Materials Engineer / Bureau Chief

Signature:_____ Date: _____

Division/District Administrator:

Name: Dwane Kailey, P.E. Title: Chief Engineer

Signature:_____ Date: _____

Department Designee:

Keni Grose/Designee

Acting Human Resources Administrator
Human Resources Division

Signature:_____ Date: _____